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Assessing the readability of diabetes information provided by the Turkish Ministry of Health

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ABSTRACT

Aims: The aim of this study is to analyze the readability levels of diabetes-related texts available on the official website of the General Directorate of Public Health of the Turkish Ministry of Health, and to use the findings to guide the preparation of future informational texts.

Methods: This research is a descriptive study based on document analysis, aiming to determine the readability of diabetes-related texts developed by the Turkish Ministry of Health. The data was obtained from publicly accessible educational texts published on the General Directorate of Public Health's website (Cited 2024, June 20. Available from: https://hsgm.saglik.gov.tr/tr/diyabet). The Ateşman readability formula was used to evaluate the readability levels of the texts.

Results: A total of 32 documents under four main headings were examined using the Ateşman formula, and the average readability score of the texts was found to be 61.69±10.15. Based on their readability levels, 28.1% texts were classified as 'Easy', 56.2% as 'Moderately Difficult', and 15.6% as 'Difficult'. Among the 13 texts in the Type 1 Diabetes group, 46.1% were 'Easy' and 53.8% were 'Moderately Difficult'. In the Type 2 Diabetes group, 17.6% were 'Easy', 64.7% were 'Moderately Difficult', and 17.6% were 'Difficult'.

Conclusion: The readability levels of the analyzed texts in our study are generally in the "Moderately Difficult" category; however, some texts were found to be in the "Difficult" readability level. The readability and understandability of educational materials prepared to improve public health are of great importance. Regular review and optimization of the readability levels of educational materials will enhance public health literacy, contributing to the development of healthier individuals and a healthier society.

Keywords: Diabetes mellitus, readability, public health education, ateşman readability index, health information

INTRODUCTION

The transformation and advancements in information technology and the widespread use of the internet over the years have significantly facilitated access to health information. Nowadays, many users research various health-related topics on websites before consulting doctors. A study by Murray and colleagues indicated that 85% of patients research health issues on the internet before a doctor's appointment.[1] However, there is no legal regulation or mechanism governing the sources of health information on the internet, nor is the accuracy of this information monitored. This increases the risk of spreading incorrect or misleading information.[2] In Turkiye, various educational materials are prepared and distributed by the Public Health Directorate of the Ministry of Health to enhance public health awareness and ensure access to accurate information. These informational texts must contain adequate and comprehensible information that citizens can access and understand.[3]

In the effectiveness of chronic disease treatments, it is crucial not only for healthcare professionals to provide treatment but also for patients to be aware of the disease and cooperate with the physician.[4] Readability refers to the ease with which any written text can be understood by the reader.[5] Various measures, formulas, and indices can be used for readability analysis. For this purpose, formulas such as the Smog-Simple measure, Gunning-Fog index, Flesch-Kincaid grade level, and ARI-automatic readability index can be used. The Ateşman readability index, which uses average word and sentence lengths, is suitable for the structure of the Turkish

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language and can be used for Turkish texts.[6,7] According to the Ateşman readability index, texts with a range of 90-100 are classified as very easy; 70-89 as easy; 50-69 as moderately difficult; 30-49 as difficult; and 1-29 as very difficult (Table 1).[8]

Table 1. Readability classification according to the Ateşman readability formula

Readability level	Score range
Very difficult	1-29
Difficult	30-49
Moderately difficult	50-69
Easy	70-89
Very easy	90-100

Diabetes mellitus is a significant health problem with high morbidity, mortality, and treatment costs for both patients and society. With technological advancements, a sedentary lifestyle, and the widespread prevalence of obesity, its incidence is increasing globally.[9] The prevalence of diabetes is rapidly increasing in Turkiye. While the TURDEP I study conducted in 2000 found a prevalence of 7.8% in individuals over 20 years of age, the results of PURE, CREDIT, and TURDEP II studies conducted in 2009 and 2010 found a prevalence of 14-16%.[10] Effective management of diabetes requires not only medical intervention but also active cooperation from patients who must be well-informed about their condition.

The aim of this study is to analyze the readability levels of diabetes-related texts available on the official website of the General Directorate of Public Health of the Turkish Ministry of Health and to use the findings to guide the preparation of future informational texts.

METHODS

This research is a descriptive study based on document analysis, aiming to determine the readability of diabetes-related texts developed by the Turkish Ministry of Health. As publicly accessible information was used, and as it does not entail the utilization of human subjects or patient data ethical approval was waived for this study. All procedures were carried out in accordance with the ethical rules and the principles. The research data was obtained from educational texts published on the General Directorate of Public Health's website (Cited 2024, June 20. Available from: https://hsgm.saglik.gov.tr/tr/diyabet). All documents on the page were examined in four groups: Type 1 Diabetes, Type 2 Diabetes, Gestational Diabetes, and Diabetes due to Other Specific Causes. The texts available in PDF format on the website were downloaded, tables and figures were removed, and the content was transferred to a Microsoft 365 Version 2402 Word document without modification.

To evaluate the readability of the texts, the data was transferred to a free online readability level calculator (http://okunabilirlikindeksi.com/). This calculator uses the Flesch readability formula adapted to Turkish by Ateşman (1997).[7] This formula calculates the readability levels of texts based on the total number of syllables, words, and sentences, as follows: readability score=198.825 - (40.175 x average word length) - (2.610 x average sentence length). The Ateşman Readability Formula accepts groups of words ending with a period (.), question mark (?), exclamation mark (!), and ellipsis (...) as sentences. Sequential dependent clauses separated by commas (,) are considered as a single sentence. The average word length (AWL) represents the average number of syllables per word, while the average sentence length (ASL) represents the average number of words per sentence. Using the Ateşman Readability Formula, a readability score ranging from 1 to 100 is obtained. These scores are categorized into five different levels to determine readability levels. The details of the Ateşman Readability classification are presented in Table 1.

Statistical Analysis

It was conducted using SPSS 24 (SPSS Inc., Chicago, IL, USA) statistical package program. The Kolmogorov-Smirnov test was used to determine the normality distribution. The mean, standard deviation, minimum, and maximum values of the data were calculated. Readability index values were classified according to the Ateşman readability classification (Table 1).

RESULTS

Diabetes-related texts available on the General Directorate of Public Health's website were examined. According to the Ateşman formula, 32 documents under four main headings were analyzed, and the AWL values ranged between 2.48-3.25, while the ASL values ranged between 6-18.2. The average Ateşman readability score was found to be 61.69±10.15. The AWL and ASL values, along with the readability scores of all texts, are presented in Table 2. According to the Ateşman readability levels, 9 (28.1%) of the diabetes-related texts were 'Easy', 18 (56.2%) were 'Moderately Difficult', and 5 (15.6%) were 'Difficult', with an overall readability of 'Moderately Difficult' for all texts. The texts classified as 'Difficult' were related to Gestational Diabetes, Diabetes due to Other Specific Causes, and three specific texts within the Type 2 Diabetes group: 'What Does Type 2 Diabetes Treatment Include?', 'Oral Drug Treatment in Type 2 Diabetes', and 'Diet and Herbal Products in Type 2 Diabetes'. No texts were classified as 'Very Easy' or 'Very Difficult' according to the Ateşman formula. Overall, when evaluated without grouping, 28.1% (n=9) of the texts were 'Easy', 56.2% (n=18) were 'Moderately.

Table 2. Readability scores of texts according to the Ateşman formula

Text title	AWL	ASL	Score	Difficulty
Type 1 diabetes				
1.1. What is diabetes?	2.76	8.2	66.5	M. difficult
1.2. Types of diabetes	2.64	7.1	74.2	Easy
1.3. Symptoms and diagnosis of diabetes	2.48	9.1	75.4	Easy
1.4. General information on T1D and insulin	2.72	6.8	71.8	Easy
1.5. T1D and nutrition	2.72	11.8	58.8	M. difficult
1.6.Diet and herbal products in T1D	2.8	9.8	60.8	M. difficult
1.7. Exercise in T1D	2.68	8.7	68.4	M. difficult
1.8. Sudden low blood sugar	2.56	6.8	78.2	Easy
1.9. Sudden high blood sugar	2.6	7.7	74.3	Easy
1.10. T1D in disease conditions	2.89	12.1	51.1	M. difficult
1.11. Importance of self-monitoring in T1D	2.72	10.6	61.9	M. difficult
1.12. Surveillance in T1D	2.93	10.6	53.4	M. difficult
1.13. Living with diabetes	2.6	8.9	71.1	Easy
Type 2 diabetes				
2.1. What is T2D?	2.76	8.4	66	M. difficult
2.2. Types of T2D	2.72	7.1	71	Easy
2.3. Symptoms and diagnosis of T2D	2.56	12.4	63.6	M. difficult
2.4. Who Is at risk for T2D and what ıs prediabetes	2.68	7.2	72.4	Easy
2.5. Importance of controlling T2D	2.76	8.9	64.7	M. difficult
2.6. Pregnancy and T2D	2.8	13.1	52.1	M. difficult
2.7. What does T2D treatment include?	3.25	8.8	45.3	Difficult
2.8. Healthy nutrition for diabetes	2.72	14	53	M. difficult
2.9. Principles of nutritional therapy in T2D	2.6	10.9	65.9	M. difficult
2.10. Oral medication treatment in T2D	2.85	16.9	40.2	Difficult
2.11. General information on insulin treatment in T2D	2.76	11	59.2	M. difficult
2.12. Essential information on insulin administration in T2D	2.72	12	58.2	M. difficult
2.13. Physical activity in T2D	2.85	11	55.6	M. difficult
2.14. Health ıssues related to T2D	2.68	7.9	70.5	Easy
2.15. Foot care in T2D	2.93	6	65.5	M. difficult
2.16. Living with T2D	2.89	11.1	53.7	M. difficult
2.17. Diet and herbal products in T2D	2.89	13.1	48.5	Difficult
Gestational diabetes	3.01	15.4	37.7	Difficult
Diabetes due to other specific causes	2.68	18.2	43.7	Difficult
Average±SD	2.75±0.14	10.36±2.95	61.69±10.15	

AWL: Average Word Length ASL: Average Sentence Length, SD:Standard deviation M: Moderately, T1D: Type 1 diabetes, T2D: Type 2 diabetes

Difficult', and 15.6% (n=5) were 'Difficult'. In the Type 1 Diabetes group, 46.1% (n=6) of the 13 texts were 'Easy' and 53.8% (n=7) were 'Moderately Difficult', while in the Type 2 Diabetes group, 17.6% (n=3) of the 17 texts were 'Easy', 64.7% (n=11) were 'Moderately Difficult', and 17.6% (n=3) were 'Difficult'.

DISCUSSION

This research is the first study in Turkiye analyzing the texts prepared to inform the public about diabetes. and it found that the average readability level of the informational texts was at a college level and of moderate difficulty.

With technological advancements. access to information has become significantly easier. Studies show that more than 70% of adults search for health information online. and over 30% attempt to diagnose a medical problem for themselves or someone they care for.[11] The increased use of the internet as an information source has led to the important issue of accessing incorrect. misleading. and inconsistent information. Accurate and easily understandable information is essential for managing an individual's health effectively. Individuals who have access to reliable and easily comprehensible health information are better positioned to manage their health. enhance their knowledge and skills. and consequently reduce healthcare costs while improving their quality of life.[15]

It is well known that the educational level of readers plays a critical role in understanding texts. To ensure that health-related texts published online are understood. they must align with the literacy and educational level of the general population.[12] A study conducted in Turkiye in 2010 reported that the average education duration of individuals aged 15 and over was 7.18 years.[13] The 2011 Human Development Report found that the average education duration in Turkish society was 6.5 years.[14] In light of these findings. it is essential to prepare educational materials using clear and comprehensible language. This approach ensures that information is accessible and understandable to a wide audience. thereby enhancing health literacy across the population.

According to Ateşman. the average sentence length in Turkish is 9-10 words. and the average word length is 2.6 syllables.[8] To improve the readability of health-related information. it has been suggested that sentences should be limited to 8-10 words and that simpler words should be used instead of complex medical terms.[16] In our study. the average word length was found to be 2.75 syllables. and the average sentence length was 10.36 words. slightly above the expected values. In the study by Muslu et al.[3] evaluating the readability of the Ministry of Health's brochures on nutrition. the average readability level was found to be 'Moderate' difficulty. Numerous studies in our country have evaluated the readability of web-based patient information materials using the Ateşman readability formula. In the study by Saldırım et al.[17] evaluating the readability of educational materials related to tinnitus. the readability of the texts was found to be 'Difficult'. Another study on

hoarseness found the readability index to be of 'Moderate' difficulty.[18] In the study by Tahir et al.[19] on dizziness. the readability of the evaluated texts was found to be 'Easy'. Similar studies in dentistry found the readability levels to be of 'Moderate' difficulty.[2,20] The difference of our study is that it evaluates the texts prepared by an official state institution aimed at informing the public.

The readability levels of the analyzed texts in our study are generally in the "moderately difficult" category; however. some texts were found to be in the "difficult" readability level. Particularly. the texts related to gestational diabetes and diabetes due to other specific causes were found to be more complex. Considering that the average education level in Turkiye is 6.5 years. the readability levels of educational materials should be reviewed and improved especially in these contexts.[14] We suggest that it would be more appropriate to write the texts at a level suitable for at least 4th and 5th-grade students.

Limitations

This study primarily relied on the Ateşman readability formula. the most widely used index for Turkish texts. to evaluate readability. While this formula is well-suited for analyzing Turkish language texts. its sole use presents a limitation. Another limitation is that the Ateşman formula is based solely on written texts and may be insufficient for evaluating the readability of visual materials. graphics. and tables.[3] With technological advancements. the use of visual elements in educational materials is increasing. which limits the effectiveness of these formulas. Future research should focus on developing more comprehensive evaluation tools that include the readability of tables. graphics. and other visual content and also benefit from incorporating multiple readability formulas to provide a more comprehensive evaluation of text readability.

CONCLUSION

Our study found that the educational materials published by the General Directorate of Public Health regarding diabetes have an average readability level classified as moderate difficulty according to the Ateşman readability formula. The readability and comprehensibility of educational materials prepared to improve public health and enhance individuals' health knowledge levels are of great importance. They should be written in a language that readers can easily follow and comprehend. Writing these materials in a clear. simple. and easily understandable language will facilitate the accessibility and comprehension of this information by a broad segment of society. Regular review and optimization of the readability levels of educational materials will enhance public health literacy. contributing to the development of healthier individuals and. consequently. a healthier society

ETHICAL DECLARATIONS

Ethics Committee Approval

As publicly accessible information was used and as it does not entail the utilization of human subjects or patient data ethical approval was waived for this study.

Informed Consent

As publicly accessible information was used and as it does not entail the utilization of human subjects or patient data informed consent was waived for this study.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design. execution. and analysis of the paper. and that they have approved the final version.

REFERENCES

1. Murray E, Lo B, Pollack L, et al. The impact of health information on the Internet on health care and the physician-patient relationship: national U.S. survey among 1.050 U.S. physicians. *J Med Internet Res*. 2003;5(3):e17.
2. Taşdemir İ. İnternet ortamındaki dişeti hastalığı ile ilgili bilgilerin okunabilirlik analizi. *Selcuk Dent J*. 2023;10(1):89-93.
3. Muslu M. Yüksel Eİ. Türkiye Cumhuriyeti Sağlık Bakanlığı tarafından geliştirilmiş beslenme ile ilgili broşürlerin okunabilirlik düzeyinin belirlenmesi. *Bilecik Şeyh Edebali Üniversitesi Sağlık Bilimleri Fakültesi Dergisi*. 2023;1(2):81-91.
4. Usta Atmaca H, Akbas F, Şak T, Şak D, Acar S, Niyazioglu M. Diyabetik hastalarda hastalık bilinç düzeyi ve farkındalık. *İstanbul Med J*. 2015;16(3):101-114.
5. Durukan E. Metinlerin okunabilirlik düzeyleri ile öğrencilerin okuma becerileri arsındaki ilişki. *Ana Dili Eğitimi Derg.* 2014; 2(3):68-76.
6. Çoban A. Okunabilirlik kavramına yönelik bir derleme çalışması. *Dil ve Edebiyat Eğitimi Derg*. 2014;(9):96-111.
7. Flesch R. A new readability yardstick. *J Applied Psychol.* 1948;32(3): 221-233.
8. Ateşman E. Measuring readability in Turkish. *AU Tömer Lang J*. 1997;2(58):71-74.
9. Harreiter J, Roden M. Diabetes mellitus–Definition, klassifikation diagnose screening und prävention (Update 2019) [Diabetes mellitus-Definition, classification, diagnosis, screening, and prevention (Update 2019)]. *Wien Klin Wochenschr.* 2019;131(Suppl 1):6-15.
10. Diyabet 2020-2030 vizyon ve hedefler. ulusal diyabet stratejisi 10. yıl sonuç dökümanı 2023. Türkiye Diyabet Vakfı (2023)
11. Han A, Carayannopoulos AG. Readability of patient education materials in physical medicine and rehabilitation (PM&R): a comparative cross-sectional study. *PM R*. 2020;12(4):368-373.
12. Tolu S, Basım P. A New perspective on readability and content assessment of patient information texts published on the internet sites on lymphedema. *J Current Researches on Health Sector*. 2018;8(2):303-314.
13. Türkyılmaz AS, Eryurt MA, Akadlı Ergöçmen B, et al. 2013 Türkiye nüfus ve sağlık araştırması. Elma teknik basım matbaacılık. Ankara, 2014

14. Klugman J. Human development report 2011. Sustainability and equity: a better future for all. Sustainability and equity: a better future for all (November 2. 2011) UNDP-HDRO Human Development Reports.
15. Murphy J, Vaughn J, Gelber K, Geller A, Zakowski M. Readability, content, quality and accuracy assessment of internet-based patient education materials relating to labor analgesia. *Int J Obstet Anesth.* 2019;39:82-87.
16. Dale E, Chall JS. The concept of readability. *Elementary English*. 1949;26(1):19-26
17. Saldırım HB, Eren M, Kurtuluş N, Kırlaroğlu SN, Şerbetçioğlu MB. Tinnitus ile ilgili çevrim içi hasta bilgilendirme materyallerinin okunabilirliğinin değerlendirilmesi. *Balkan Health Sci J*. 2023; 2(1):1-6.
18. Sezin RK, Biçen ŞN. Readability and quality levels of online patient information texts regarding hoarseness of voice. *J Ear Nose and Throat Head Neck Surgery.* 2023;31(3):170-178.
19. Tahir E, Kent AE. Readability analysis of internet-based patient information regarding dizziness. *KBB-Forum*. 2021;20(2):163-170.
20. Akbulut AS. İnternet ortamındaki şeffaf plak tedavisi ile ilgili bilgilerin okunabilirlik analizi. *NEU Dent J*. 2022;4(1):7-11.